



Designation: **C1093—22 C1093 – 22a**

Standard Practice for Accreditation of Testing Agencies for Masonry¹

This standard is issued under the fixed designation C1093; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This practice covers the minimum requirements for laboratory personnel, for establishing and maintaining a quality system, and it establishes minimum qualifications for agencies engaged in the testing of masonry materials.

1.2 Criteria are provided for evaluating the capability of an agency to properly perform designated tests on masonry materials, and for establishing guidelines pertaining to an agency's organization, personnel, facilities, and quality system. This practice may be supplemented by more specific criteria and requirements for particular projects.

1.3 This practice can be used as a basis to evaluate testing agencies, and it is intended for use for the qualifying or accrediting of testing agencies, or both, public or private, engaged in the testing of masonry materials.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- C67/C67M Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C109/C109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens)
- C117 Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C136/C136M Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C140/C140M Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
- C173/C173M Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
- C185 Test Method for Air Content of Hydraulic Cement Mortar
- C230/C230M Specification for Flow Table for Use in Tests of Hydraulic Cement
- C231/C231M Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- C270 Specification for Mortar for Unit Masonry
- C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

¹ This practice is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.07 on Standards for Laboratory Accreditation.

Current edition approved Feb. 1, 2022. Dec. 1, 2022. Published February 2022. Originally approved in 1988. Last previous edition approved in 2019 as C1093 – 19. C1093 – 22. DOI: 10.1520/C1093-22.10.1520/C1093-22A.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard

[C470/C470M](#) Specification for Molds for Forming Concrete Test Cylinders Vertically
[C780](#) Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry
[C1019](#) Test Method for Sampling and Testing Grout for Masonry
[C1072](#) Test Methods for Measurement of Masonry Flexural Bond Strength
[C1232](#) Terminology for Masonry
[C1314](#) Test Method for Compressive Strength of Masonry Prisms
[C1506](#) Test Method for Water Retention of Hydraulic Cement-Based Mortars and Plasters
[C1552](#) Practice for Capping Concrete Masonry Units, Related Units and Masonry Prisms for Compression Testing
[C1716/C1716M](#) Specification for Compression Testing Machine Requirements for Concrete Masonry Units, Related Units, and Prisms
[E4](#) Practices for Force Calibration and Verification of Testing Machines
[E11](#) Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 Definitions:

3.1.1 *quality system*—the organizational structure, responsibilities, procedures, processes, capabilities, and resources for implementing quality management.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *agency*—the organization engaged to test masonry materials as required by a specification or contract.

3.2.2 *quality system manual (QSM)*—a manual describing and documenting an agency’s quality system.

3.2.3 *user*—the person or organization engaging the agency to provide tests; or using this practice to evaluate or accredit the agency.

3.3 For additional terms used in this standard, refer to Terminology [C1232](#).

4. Significance and Use

4.1 This practice provides the basic minimum criteria for use in evaluating the qualifications of testing agencies for masonry materials. The criteria may be supplemented by more specific criteria and requirements. It can be used as a guide for internal audits by individual users.

4.2 The intent of this practice is to provide a consensus basis for evaluating a testing agency, with respect to that agency’s capability to objectively and competently provide the specific services needed by the user.

4.3 This practice may be used as a basis for accreditation.

5. Responsibilities and Duties

5.1 The agency shall ensure that only tests for which it is adequately equipped and staffed are performed.

5.2 The agency shall ensure that personnel perform only tests for which they are adequately trained, qualified, and certified in accordance with applicable specifications.

5.3 The agency shall ensure that all equipment is properly maintained in good operating condition and is calibrated or verified as applicable.

5.4 The agency shall perform all testing in accordance with appropriate standards and quality control criteria. Documents unique to the user shall be furnished to the agency.

6. General Capabilities

6.1 *Laboratory Testing*—The laboratory testing services of the masonry materials testing agency shall include some or all of the following capabilities:

- 6.1.1 Testing of masonry units in the laboratory,
- 6.1.2 Testing of masonry mortars in the laboratory, and
- 6.1.3 Testing of aggregates for compliance with specification requirements.

NOTE 1—Since the requirements for construction control can vary from project to project depending upon the nature of the type, location, and intended use of the masonry in the project, the capability of the agency for testing should be that necessary to accomplish construction control for the user's specific project or special requirements.

7. Personnel Qualifications

7.1 *Management and Supervision*—All relevant testing services shall be provided under the Full-Time technical direction of a registered professional Engineer, with at least five years of experience in inspecting and testing masonry materials or a person of equivalent science-oriented education and experience.

7.2 *Supervising Technician*—The supervising technician(s) shall have at least five years experience performing tests on materials, with at least two years testing masonry materials.

7.2.1 Personnel supervising laboratory testing shall have current certification(s). The certification(s) shall conform to the requirements in 7.4. Certification is not required for test methods listed in 7.2.1.1 that are outside of the scope of the testing agency.

7.2.1.1 The certification(s) shall include a written examination and performance examination for the following standards: Test Methods C140/C140M, C780, C1019, and Practice C1552. Certification(s) for laboratory testing shall include a written examination for the following standards: Specification C270 and Test Method C1314.

7.2.2 Personnel supervising field testing shall have current certification(s). The certification(s) shall conform to the requirements in 7.4. Certification is not required for test methods listed in 7.2.2.1 that are outside of the scope of the testing agency.

7.2.2.1 The certification(s) shall include a written examination and performance examination for the following standards: Test Methods C140/C140M, C780, and C1019. The certification shall include a written examination for the following standard: Test Method C1314.

7.3 *Technicians*—Personnel performing laboratory and field testing shall possess current certifications that include each standard identified in 7.3.1 and 7.3.2, and shall conform to 7.4. Certification is not required for test methods listed in 7.3.1 and 7.3.2 that are outside of the scope of the testing agency.

7.3.1 Certification(s) for laboratory testing shall include a written examination and performance examination for the following standards: Test Methods C140/C140M, C780, C1019, and Practice C1552. Certification(s) for laboratory testing shall include a written examination for the following standards: Specification C270 and Test Method C1314.

7.3.2 Certification(s) for field testing shall include a written examination and performance examination for the following standards: Test Methods C140/C140M, C780, and C1019. Certification(s) for field testing shall include a written examination for the following standard: Test Method C1314.

7.4 The technician certification program shall meet the following criteria:

7.4.1 The written examination shall cover the test method or practice, including, as applicable: the significance of the test or practice, sampling and specimen preparation procedures, calculations, and reporting of results,

7.4.2 The performance examination shall include a demonstration of the test method or practice, to document the technician's ability to correctly perform the procedure in accordance with the standard, and

7.4.3 The written and performance examinations shall include all relevant test methods that are listed in the section above for the type of technician being certified.

7.4.4 The period of certification shall not exceed five years.

7.4.5 The period for which the certification is valid shall be clearly and prominently stated on any documents that attest to the certification(s) held by the individual.

7.5 It is satisfactory for a person to fill one or more positions in an agency providing that person is qualified for each position.

NOTE 2—Established certification programs exist for Test Methods C140/C140M, C780, C1019, and Practice C1552 which include a written examination for Specifications C270 and Test Method C1314. These should be used when applicable.

8. Quality System Criteria

8.1 The agency shall establish and implement a quality system that meets the criteria in subsections 8.2 to 8.14.

8.2 *Quality System Manual (QSM)*—The agency shall establish and maintain a QSM that conforms to the requirements in Section 9. Each document in the QSM shall indicate its preparation *date*. If a document is revised, the *date* of revision shall be indicated on the document. The QSM shall be available for use by laboratory staff.

8.3 *Quality System Management*—The agency shall designate a person(s) having responsibility for the quality system and its implementation. The quality manager ensures that activities are being conducted by agency staff in the manner specified in the agency's quality system manual and has responsibility for maintaining and revising it. This individual(s) shall have direct access to top management (see Note 3).

NOTE 3—This individual(s) may have other responsibilities (for example, laboratory manager).

8.4 *Laboratory Procedure Manual*—A written laboratory procedure manual outlining the method or inspection procedure for each test or service performed by the laboratory.

<https://standards.iteh.ai/catalog/standards/sist/21d5ef2a-561f-44e3-a791-02fa602af293/astm-c1093-22a>

NOTE 4—Inspection and testing procedures may reference published standards.

8.5 *Equipment*—The agency shall calibrate or verify all significant testing equipment associated with tests covered by the scope of this standard which the agency performs. As a minimum, the equipment listed in 8.5.2 shall be included if it is associated with tests performed by the agency. Applicable equipment shall be calibrated or verified at the intervals specified in the agency's QSM. The intervals specified in the QSM shall be no greater than those indicated in 8.5.2 (see Note 6). Newly acquired equipment without manufacturer's certification and equipment that has not been calibrated or verified because it has been removed from service shall be calibrated or verified before being placed in service. The agency shall have detailed written procedures for all in-house calibration and verification activities not addressed in standards. These procedures shall indicate the equipment required to perform the calibration or verification. In addition to standard test method requirements, the conditions listed in 8.5.2 shall be met.

8.5.1 *Calibration and Verification Records*—The agency shall maintain calibration and verification records for all equipment specified in the QSM. Such records shall include:

8.5.1.1 Description of the equipment calibrated or verified, including identification of the specific piece of equipment using the equipment serial number or other unique identifying designator provided by the agency (see Note 7),

8.5.1.2 Date the work was done,

8.5.1.3 Identification of individual performing work,

8.5.1.4 Identification of calibration or verification procedure used,

- 8.5.1.5 The previous calibration or verification date and next due date,
- 8.5.1.6 Identification of any calibration or verification device used, and
- 8.5.1.7 Specific criteria required for each piece of equipment listed in 8.5.2.

8.5.2 *Masonry Test Equipment:*

8.5.2.1 *Balances and Weights*—Calibrate balances and weights at intervals not exceeding 12 months. Record shall include test points and corresponding percentage of error.

8.5.2.2 *Cube Molds and Tampers*—Verify cube molds and tampers for conformance to the design and dimensional requirements of Test Method C109/C109M. Verification for cube molds shall be performed at intervals not exceeding 30 months and verification for tampers shall be performed at intervals not exceeding 6 months.

8.5.2.3 *Compression Test Machine*—Compression test machine shall conform to the applicable requirements of the test method being performed. The machine shall have a capacity, loading range, and the appropriate heads and bearing plates for the specimens tested. Calibrate compression testing machines in accordance with Practices E4. Record shall include test points and corresponding percentage of error. Calibration shall be performed at intervals not exceeding 12 months.

NOTE 5—There are several test methods that contain compression machine requirements for testing of masonry products, including Test Methods C67/C67M, C109/C109M, C140/C140M, C1314, and Specification C1716/C1716M. The relevant standard for the test being performed should be consulted for specific compression machine requirements.

8.5.2.4 *Flexural Bond Apparatus*—Flexural bond apparatus shall conform to the applicable requirements of Test Method C1072. Calibrate the load measuring apparatus in accordance with Practices E4. Record shall include test points and corresponding percentage of error. Calibration shall be performed at intervals not exceeding 12 months.

8.5.2.5 *Mechanical Shakers*—Verify the period of mechanical agitation of mechanical shakers for adequacy of sieving as described in Test Method C136/C136M. Record shall include length of time for the proper efficiency of sieving. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.6 *Mixers (for Specification C270)*—Inspect and verify mixers for conformance to the requirements of Practice C305. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.7 *Cylindrical Molds*—Cylindrical molds shall comply with the requirements of Specification C470/C470M. Record shall include dimensions and results of water-tightness test. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.8 *Ovens*—Verify oven settings with a verified reference temperature measuring device. Record shall include oven settings, temperature reading at each oven setting, and adjustments if necessary. Verification shall be performed at intervals not exceeding twelve months.

8.5.2.9 *Sieve Accuracy*—Verify sieve accuracy at least annually on each sieve used for sieve analysis (Test Methods C117 and C136/C136M). Use any of the following methods of verification:

- Method (1) Verification of each sieve in accordance with the procedures prescribed in the Annex of Specification E11.
 - Method (2) A comparison of the results of a split sample sieved on different sieve sets. Results shall be verified that a single operator precision is within the acceptable range of two results stated in the test method.
 - Method (3) Participation in a sieve analysis test in an aggregate proficiency sample program. Results shall be verified for multi-laboratory precision to be within the acceptable range of two results stated in the test method.
- Each method of sieve verification shall include an inspection of the sieve cloth for punctures or obvious defects.

8.5.2.10 *Temperature Measuring Device*—Verify temperature measuring devices using a NIST-traceable reference temperature measuring device. Record shall include test points and readings at test points. Verification shall be performed at intervals not exceeding twelve months.

8.5.2.11 *Timers*—Verify timers for accuracy. Record shall include test points, readings at test points. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.12 *Water Retention*—Verify water retention apparatus for conformance to the applicable requirements of Test Method **C1506**. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.13 *Air Content Measure*—Verify air content measure following the procedures described in Test Method **C185**. Verification shall be performed at intervals not exceeding 30 months.

8.5.2.14 *Flow Table*—Verify flow table using the calibration material described in Specification **C230/C230M**. Verification shall be performed at intervals not exceeding 30 months, and when table is moved.

8.5.2.15 *Cone Penetrometer*—Verify cone penetrometer for the applicable requirements of Test Method **C780**. Record shall include measured dimensions and masses. Verification shall be performed at intervals not exceeding 12 months. The unit measure used in the cone penetrometer test in Annex A1 and A2 of Test Method **C780** is required to conform to Test Method **C185**. The verification procedure for the unit measure shall be performed following the procedures in Test Method **C185** at intervals not exceeding 30 months.

8.5.2.16 *Slump Cone and Tamping Rod*—Verify slump cone and tamping rod for the applicable requirements of Test Method **C143/C143M**. Record shall include measured dimensions. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.17 *Pressure Meter*—Calibrate pressure meter using the procedure found in Test Method **C231/C231M**. Record shall include determination of expansion factor; size of the calibration vessel used; and the reading of the meter at the calibration test point(s). Calibration shall be performed at intervals not exceeding 3 months.

8.5.2.18 *Volumetric Air Meter*—Verify volumetric air meter using the procedure found in Test Method **C173/C173M**. Record shall include dimensions and volume of meter and calibration cup. Verification shall be performed at intervals not exceeding 12 months.

8.5.2.19 *Measuring Devices*—Devices used to measure dimensions shall be verified to be accurate and readable to the precision required by the test methods where they are used. Verification record shall include test points used during verification, and readings at test points. Verification shall be performed at intervals not exceeding 12 months.

NOTE 6—When a maximum calibration or verification interval for a specific piece of test equipment is specified in a standard, the maximum interval specified by this practice is intended to be the same as the maximum interval specified by the standard.

NOTE 7—When standard calibration procedures are used, the standard shall be referenced. When the procedure used has been prepared by the agency, the in-house designation shall be referenced. It shall be indicated if the work is performed by an outside agency.

NOTE 8—For calibration records for cube molds and tampers, mixers, water retention apparatus, air content measure, and flow table, documentation of equipment inspection by an evaluation authority is acceptable.

8.6 *Inspection of Facilities*—The agency shall have its laboratory procedures and equipment evaluated at intervals of approximately two years by an evaluation authority as evidence of its competence to perform the required test. Within 30 days of the receipt of the evaluation authority's written report, the agency shall address or correct any deficiencies cited in the report. The laboratory shall report corrections made to the evaluation authority or include a plan of action to implement the corrections in response to the on-site inspection report.

8.7 *Agency Accreditation*—The agency shall possess a certificate of accreditation, from a national authority as evidence that it meets the requirement of this practice.

8.8 *Proficiency Sample Testing*—The agency shall participate in applicable proficiency sample programs.

8.9 *Test Records*—The agency shall maintain test records that contain sufficient information to permit verification of any test reports. Records pertaining to testing shall include traceability of sample from source to agency, original observations, calculations, derived data, and an identification of personnel involved in sampling and testing. The agency shall prepare test reports that clearly, accurately, and unambiguously present the information specified in **Table 1**. The procedure for amending reports shall require that the previously existing report be clearly referenced when an amendment is made. The references shall establish a clear audit trail from the latest issuance or deletion to the original report and its supporting data.

TABLE 1 Test Report Requirements (see Note 9)

—Name and address of the testing laboratory
—Identification of the report and the date issued
—Name and address of the client or identification of the project
—Description and identification of the test sample
—Date of receipt of the test sample
—Date(s) of test performance
—Identification of the standard test method used and a notation of any known deviations from the test method
—Test results and other pertinent data required by the standard test method
—Name of the person(s) accepting technical responsibility for the test report

NOTE 9—The requirements in Table 1 apply to the report that is used to present the laboratory’s test results in their final form. In some cases, a test report or test data sheet is the final form of the data.

8.10 *Record Retention*—Records pertaining to testing, equipment calibration and verification, test reports, internal quality system reviews, proficiency sample testing, test technician training and evaluation, and personnel shall be retained by the laboratory in a secure location for a minimum of one year.

NOTE 10—Although a one-year retention schedule is adequate in some instances, there are many circumstances when a longer retention may be advantageous to the agency. Records concerning the calibration and verification of equipment are an example. Retention schedules of this type usually require such records to be held throughout the useful life of the equipment.

8.11 *Traceability of Calibrations*—The agency shall demonstrate conclusively that a particular instrument or artifact either has been calibrated by NIST or has been calibrated against another standard or physical constant through an unbroken chain of comparisons.

8.12 *External Audit Records*—The agency shall maintain records of any external audits and documentation describing how the deficiencies were corrected.

8.13 *Proficiency Sample Records*—The agency shall retain results of participation in proficiency sample programs including data sheets, summary reports, and documentation describing steps taken to determine the cause of poor results and corrective actions taken.

8.14 *Test Methods and Procedures*—The agency shall maintain copies of standard and nonstandard procedures for testing performed that is covered by the scope of the service offered by the laboratory and shall ensure that the procedures are the most current and are readily accessible to employees performing the work.

9. Quality System Manual (QSM) Requirements

9.1 The agency shall establish and maintain a QSM meeting the following requirements:

9.1.1 *Organization and Organizational Policies:*

9.1.1.1 The QSM shall contain the legal name and address of the agency and that of the main office or company, if different, and any other information needed to identify the organization.

9.1.1.2 The QSM shall contain the ownership and management structure of the agency. Names, affiliations, and positions of principal and directors shall be listed.

9.1.1.3 The QSM shall contain an organization chart showing relevant internal organizational components.

9.1.1.4 The QSM shall contain a list showing relevant technical services offered.

9.1.1.5 The QSM shall contain a list showing applicable dates of the qualifications, accreditations, and recognition of the agency by others.

9.2 *Staff:*